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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/626,738	07/26/2000	Takehiko Nakai	35.C14646	9374

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EXAMINER

AMARI, ALESSANDRO V

ART UNIT PAPER NUMBER

2872

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/626,738

Applicant(s)

NAKAI, TAKEHIKO

Examiner

Alessandro V. Amari

Art Unit

2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-17 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/6/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6 April 2004 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 7-12 and 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakai et al EP 0902304.

In regard to claim 7, Nakai et al discloses (see for example, Figures 2, 5, 6A-6D, 9) a diffraction optical element in which a plurality of diffraction gratings are laminated, comprising a first diffraction grating (8) which is formed with a material of a predetermined dispersion as described in column 9, lines 33-45, column 12, lines 27-58 and column 13, lines 1-14, wherein an imaginary surface including tips of grating portions of said first diffraction grating is a curved surface as described in column 11, lines 9-11 and column 14, lines 37-40; and a second diffraction grating (9) which is

formed on a curved surface with a material of a dispersion different from that of said first diffraction grating as described in column 9, lines 33-45, and arranged with an interval (5, 6) between said first diffraction grating and said second diffraction grating, wherein an imaginary surface including tips of grating portions of said second diffraction grating is a curved surface as described in column 11, lines 1-11 and column 14, lines 37-40, wherein the pitches of corresponding grating portions of said first and second diffraction gratings are equal over the area of use as shown in Figures 5 and 6D.

Regarding claim 8, Nakai et al discloses that substrates on which said diffraction gratings are formed are joined together in the non-grating area of each of said diffraction gratings as shown in Figures 2 and 6D.

Regarding claim 9, Nakai et al discloses that at least one of said laminated diffraction gratings has at least one diffraction grating differing from it in the direction of the grating shape of the grating portion as described in column 12, lines 42-44 and as shown in Figures 2, 5 and 6D.

Regarding claim 10, Nakai et al discloses that the wavelength area used is a visible range as described in column 5, lines 1-11.

Regarding claim 11, Nakai et al discloses that at least one of said plurality of diffraction gratings is such that the material forming said diffraction gratings is the same as the material forming a substrate on which said diffraction gratings are provided as described in column 9, lines 33-42, column 12, lines 37-49 and column 13, lines 4-14 and as shown in Figure 6D.

Regarding claim 12, Nakai et al discloses that said substrate has lens action as described in column 5, lines 19-20.

Regarding claim 14, Nakai et al discloses that said plurality of diffraction gratings are laminated so that the diffraction efficiency of a particular order may heighten in the entire wavelength area used as described in column 5, lines 3-11 and as shown in Figure 8D.

Regarding claim 15, Nakai et al discloses an optical system using a diffraction optical element as described in column 5, lines 21-25 and column 14, lines 35-56 and as shown in Figures 9 and 10.

Regarding claim 16, Nakai et al discloses an optical system which is an imaging optical system as described in column 5, lines 21-25 and column 14, lines 35-56 and as shown in Figures 9 and 10.

Regarding claim 17, Nakai et al discloses an optical system which is an observation optical system as described in column 5, lines 21-25, column 14, lines 35-56, column 15, lines 24-31 and as shown in Figures 9 and 10.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakai et al EP 0902304 in view of Ogino et al US Patent 5,995,279.

Regarding claim 13, Nakai et al teaches the invention as set forth above but does not teach the diffraction optical element formed on a cemented surface of a cemented lens.

Regarding claim 13, Ogino et al. does teach the diffraction optical element formed on the cemented surface of a cemented lens as shown in Figures 5A-5F and as described in column 3, lines 3-33.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the diffraction grating of Nakai et al on the cemented surface of a cemented lens as taught by Ogino et al. in order to achieve a satisfactory bond between the grating and the lens and thus reduce aberrations.

Allowable Subject Matter

6. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 18 is allowable over the prior art for at least the reason that the prior art fails to teach or reasonably suggest, "the first and second diffraction gratings are disposed via an air layer" as set forth in the claimed combination.

The prior art of record, Cohen and Ogino et al teach a diffraction optical element in which a plurality of diffraction gratings are laminated, comprising a first diffraction grating which is formed on a curved surface with a material of a predetermined dispersion, wherein an imaginary surface including tips of grating portions of said first diffraction grating is a curved surface; and a second diffraction grating which is formed

on a curved surface with a material of a dispersion different from that of said first diffraction grating and adjacent to said first diffraction grating, wherein an imaginary surface including tips of grating portions of said second diffraction grating is a curved surface, wherein the pitches of corresponding grating portions of said first and second diffraction gratings are equal over the range of use. However, the prior art does not teach that the first and second diffraction gratings are disposed via an air layer and no motivation or teaching is present to modify this difference as derived.

Response to Arguments

7. Applicant's arguments filed 06 April 2004 have been fully considered but they are not persuasive.

The Applicant argues that the prior art, Nakai et al does not teach or suggest an embodiment in which the imaginary surfaces including tips of grating portions of first and second diffraction gratings are curved surfaces in which the pitches at positions of tips of corresponding grating portions of the first and second diffraction gratings are equal over the area of use. The Applicant asserts that these two different features (i.e., imaginary curved surface and tips of grating portions of 1st and 2nd gratings being equal over area of use) are disclosed in different embodiments but that Nakai et al does not disclose these two features in a single embodiment. Specifically, the Applicant asserts that the feature of the imaginary curved surface is disclosed in the first embodiment and the third embodiment while the equal pitch feature is disclosed in the second embodiment.

In response to this argument, the Applicant's attention is directed to Figure 2, which is described as the first embodiment. Figure 2 shows a first diffraction grating (8) formed with a material of a predetermined dispersion and a second diffraction grating (9) with a material of a dispersion different from that of the first diffraction grating and arranged with an interval (5, 6) between the gratings and wherein the pitches of the first and second gratings are equal over the area of use as clearly shown in Figure 2. Then, in column 11, lines 7-10 or paragraph 0060, Nakai states:

"The **first** embodiment described above is a diffractive optical element having a diffraction grating arranged on a flat plate. However, the same advantageous effect can be attained by arranging the diffraction grating on a **curved** lens surface." (bold Examiner's)

Therefore, the first embodiment shown in Figure 2 meets all of the claimed limitations. Furthermore, it appears that the third embodiment is simply the use of the diffractive optical element as described in the previous embodiments in an optical system of a camera or the like (see column 14, lines 17-21) and that this diffractive optical element may be on the curved surface of a lens (see column 14, lines 37-40).


8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alessandro V. Amari whose telephone number is (571) 272-2306. The examiner can normally be reached on Monday-Friday 8:00 AM to 5:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ava *am*
28 May 2004


MARK A. ROBINSON
PRIMARY EXAMINER